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T.O. 33A1-7-53-1

TECHNICAL MANUAL
OPERATION AND SERVICE

UNIT OSCILLATOR

TYPES
1215-B
1215-BS1

and

UNIT REGULATED POWER SUPPLY

TYPE
1201-B

(GENERAL RADIO)

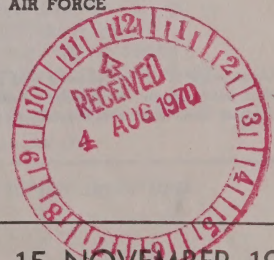
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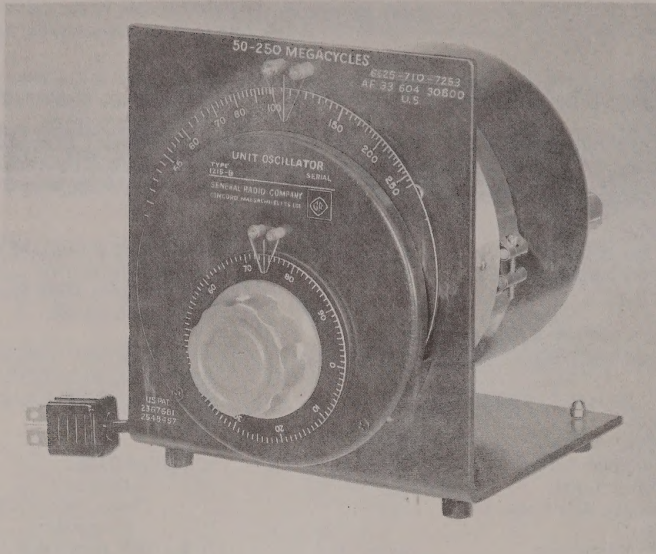


Figure 1-1. Unit Oscillator, Types 1215-B & 1215-BS1



Figure 1-2. Unit Regulated Power Supply, Type 1201-B

SECTION I

INTRODUCTION AND DESCRIPTION

1-1. INTRODUCTION. This technical manual contains instructions for the operation and service of Unit Oscillator, Type 1215-B and Type 1215-BS1 (figure 1-1) and Unit Regulated Power Supply, Type 1201-B (figure 1-2), Federal Stock Number 6625-710-7253 (for both equipments). The two oscillators are identical except that the 1215-BS1 has a Type BNC output connector and the value of two resistors (R7, R8) has been changed to provide a greater output. Work described is limited to personnel required to use the equipment, and which does not require special facilities only available at overhaul organizations. The manual also contains instructions for preparing the instruments for use, storage and shipment. The units are manufactured by the General Radio Company, West Concord, Mass.

1-2. PURPOSE OF THE EQUIPMENT.

1-3. OSCILLATOR. The Unit Oscillator, Type 1215-B or Type 1215-BS1 (hereinafter referred to as the oscillator or instrument), is a general purpose radio frequency oscillator primarily intended for use in driving impedance measuring equipments such as bridges, slotted lines and admittance meters.

1-4. POWER SUPPLY. The Unit Regulated Power Supply, Type 1201-B (hereinafter referred to as the power supply) is intended for use in providing the required voltages necessary for the operation of the oscillator. The unit is connected to the oscillator through a multipoint connector on the right hand side of the power supply. A mating plug with market terminal numbers is supplied for connecting the power supply to external equipment. Both the regulated high voltage direct current test supply and the low plate voltage alternating current supply are isolated from ground and from each other to give greater latitude in external connections.

1-5. CAPABILITIES OF OSCILLATOR.

1-6. USE AS POWER SOURCE IN GENERAL TESTING. The oscillator, in addition to its primary intended use as a power source for impedance measuring equipment, is capable of being used as a power source in general testing and measuring systems. Use of its coaxial elements adapts the instrument to various applications in coaxial combinations with the coaxial elements and adapters of other test instruments to form an assembly or system for specific purposes.

1-7. USE AS SIGNAL GENERATOR. The oscillator, as a well shielded power source, can provide an accurately known voltage for receiver testing when used with a voltmeter and attenuator. Used in another combination, the oscillator can be used as a source of television signals over its entire carrier frequency range

when provided with video modulating voltage, which can be attained from a standard television receiver tuned to a local station.

1-8. USE AS FREQUENCY CONVERTER. The oscillator can be used as a frequency converter when used with a suitable type mixer rectifier and an I-F amplifier, which is provided with the means to measure the rectified mixer current. Used in this combination, the oscillator can supply the local signal in a heterodyne converter and in this manner adapt the external I-F amplifier (or a low frequency communications receiver) for use as a sensitive detector for very high frequency signals.

1-9. USE FOR AMPLITUDE MODULATION. Direct amplitude modulation over the audio frequency range can be obtained by the oscillator with the application of external control or modulating voltages at the modulation jack J-1 provided. A suitable type audio oscillator can be connected in the cathode circuit for the application of the external control voltage for amplitude modulation.

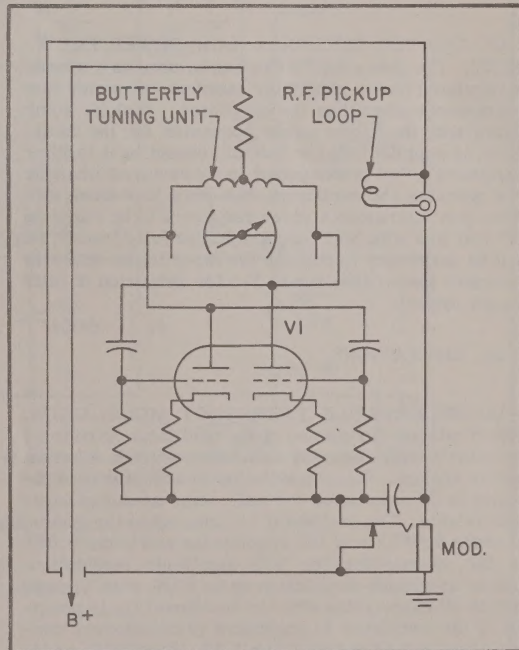


Figure 1-3. Oscillator Tuning Circuit, Basic Diagram

NOTE

Direct cathode modulation of the oscillator introduces some incidental frequency modulation. Paragraph 1-15 on limitations of the oscillator describes this frequency deviation.

1-10. USE FOR PULSE MODULATION. Pulsing and linear 100% amplitude modulation at frequencies above 60 megacycles can be attained by the oscillator when used with an external suitable type balanced modulator and provided with an external pulse source.

1-11. USE FOR SWEEP APPLICATIONS. The tuning circuit of the oscillator can be externally motor driven for sweep applications by coupling either of the oscillator panel dials and an external sweep or dial drive. Oscillator and power supply unit controls and connections are described in Section IV of this manual. The magnitude and center position of the sweep arc, as well as the sweep rate, are set by controls on the external instrument panel.

NOTE

All moving parts of the oscillator shall be lubricated in accordance with paragraph 5-6 when the oscillator is driven by a sweep or dial drive.

1-12. CAPABILITIES OF POWER SUPPLY UNIT.

1-13. USE FOR EXTERNAL LOW POWER EQUIPMENT. The power supply unit can be used as a source of regulated power supply for external low power test instruments other than the oscillator. A plug, which mates with the output power connector for the oscillator, is supplied with the unit for connecting it to other equipment. Full power output is not required when the unit operates the oscillator, but when it is used with other test instruments which require it to be run on a 125 volt line with both output voltages fully loaded, it will be necessary to replace the fuses in the unit with 1 ampere fuses. (See figure 7-3 for definition of fully loaded output).

1-14. LIMITATIONS.

1-15. UNDESIRABLE FREQUENCY MODULATION. Direct cathode modulation of the oscillator introduces some incidental frequency modulation which is inherent in this system. Since modulation is accomplished directly in the oscillator circuit, some unwanted fm is unavoidable. The incidental fm inherent in the system is under 0.01% up to 100 megacycles and under 0.05% at 250 megacycles for 50% amplitude modulation. Linear amplitude modulation up to 100% over a range of 0 to 20 megacycles with low incidental fm is possible if the oscillator is connected to an external control as described in paragraph 1-10. Amplitude modulation practically free of fm can be attained at carrier frequencies above 10 megacycles by using an external suitable type crystal diode modulator.

1-16. FULLY LOADED VOLTAGES OF POWER SUPPLY MAY BLOW FUSES WHEN UNIT IS CONNECTED TO EXTERNAL EQUIPMENT. When used as a power supply for external low power equipment with the power requirements described in paragraph 1-13, the unit power supply fuses may blow after several hours and it will be necessary to replace them.

1-17. DESCRIPTION OF EQUIPMENT.

1-18. GENERAL CONSTRUCTION OF OSCILLATOR. The oscillator, as shown in figure 1-1, is mounted on an L-shaped bracket which functions as panel and base. The oscillator unit is mounted on a cylindrical aluminum casting which serves as a support and base for the instrument and provides rf shielding. A cylindrical aluminum cover is clamped over the casting for complete shielding. The output control and the coaxial output connector are mounted at the rear of the cover. The oscillator unit is 7 inches wide by 7-5/8 inches high by 7 inches deep and weighs 7-1/2 pounds, not including the output cable.

1-19. OSCILLATOR ACCESSORIES. The oscillator is equipped with a patch cord, TYPE 874-R22, and a phone plug, TYPE CDMA. The patch cord is a 3-foot coaxial cable provided to facilitate coaxial connections to the test equipment it is intended to drive. The phone plug is provided for inserting a modulation voltage in the modulation jack J-1.

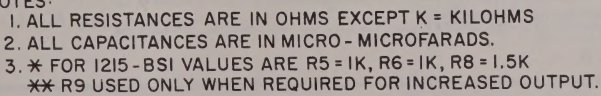
1-20. GENERAL CONSTRUCTION OF POWER SUPPLY UNIT. The power supply is a portable self-contained unit provided with an aluminum panel and chassis, an aluminum dust cover and a permanently attached power cord, as shown in figure 1-2. The cabinet consists of two U-shaped aluminum pieces, one forming the front panel and the two ends, and the other the top and bottom to accommodate the second piece, which slides in the grooves. It is held in place by pinching the two sides of the first piece together with a thumb screw and tie bar. The power supply unit is approximately a five inch cube, 4-3/4 inches wide by 5-1/4 inches high by 1-1/8 inches deep. It weighs 5 pounds not including the power cord.

1-21. POWER SUPPLY ACCESSORIES. An output plug for connecting the unit to test instruments other than the oscillator is supplied together with two spare fuses.

1-22. SIMPLIFIED PRINCIPLES OF OPERATION.

1-23. GENERAL. The oscillator operated by the power supply unit is connected to the test equipment in all of its applications (see paragraphs 1-3 through 1-5).

1-24. OSCILLATOR TUBE V-1. The oscillator is an electron-coupled adjustable frequency type, employing miniature twin triode Tube TYPE 12AT7 (V-1) operating in a push-pull circuit. Its triode sections are connected in a push-pull across the high impedance portions of the tuned circuit, as shown schematically in figure 1-3, and completely in figure 1-4.



1-3

1-25. RADIO FREQUENCY TUNING SYSTEM. The tuning system of the oscillator is a modified butterfly arrangement in which the plates are shaped to permit operation over 150 degrees rotation. There are no sliding contacts in the tuned circuit.

1-26. OUTPUT SYSTEM OF OSCILLATOR. The output system of the oscillator is coupled inductively to the tuned circuit and includes the output coupling loop L-2 as the output control. The output system consists of a short coaxial line with L-2 at one end and the built-in coaxial output connector GR Type 874 for 1215-B, Type BNC for 1215-BS1 at the other end.

1-27. OPERATION OF OSCILLATOR. Operation of the oscillator consists of adjusting the panel dial for the desired frequency in the tuning circuit and the output control loop for the required power in the output circuit and in making the coaxial connections as required for its particular application.

1-28. POWER SUPPLY UNIT CIRCUIT. Power supply unit circuit connections are shown schematically in figure 1-5 and completely in figure 1-6. A full wave doubler with two selenium rectifiers provides

the input voltage for the series regulator. The output voltage, through a voltage divider, is compared to a reference tube TYPE 5651 (V-534) by means of a differential cascode amplifier. The amplified error voltage is applied at a series regulator tube, through a cascode amplifier follower, to provide constant output voltage.

1-29. FEEDBACK. Two additional signal paths, in addition to the main feedback loop described above and inside it, are provided for improved performance. A network, which consists of R-533 and C-531 reduces the effects of input fluctuations, and R-540 is used to make the open loop gain infinite. This network provides a very low output impedance and reduces the effect of load changes on output voltage.

1-30. OPERATION OF THE POWER SUPPLY UNIT. Operation of the power supply unit consists of a screwdriver adjustment of R-551 for the required direct current voltage output necessary for the operation of the oscillator or an external low power instrument, in making connections as required, and in turning on the power supply and delivering the desired output voltages.

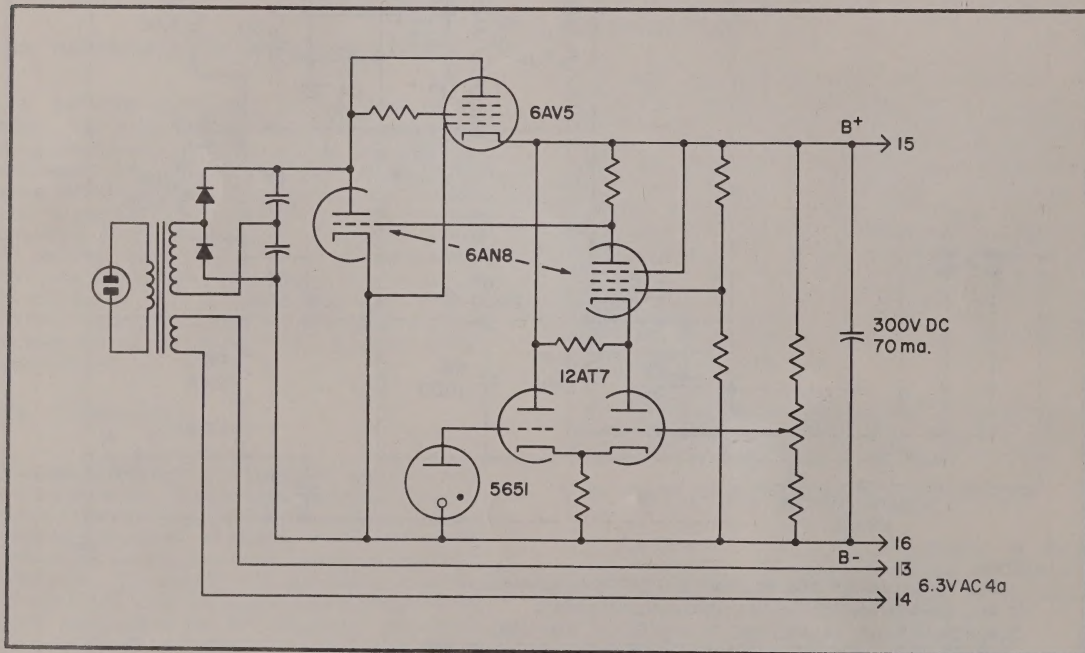


Figure 1-5. Power Supply, Basic Circuit Diagram

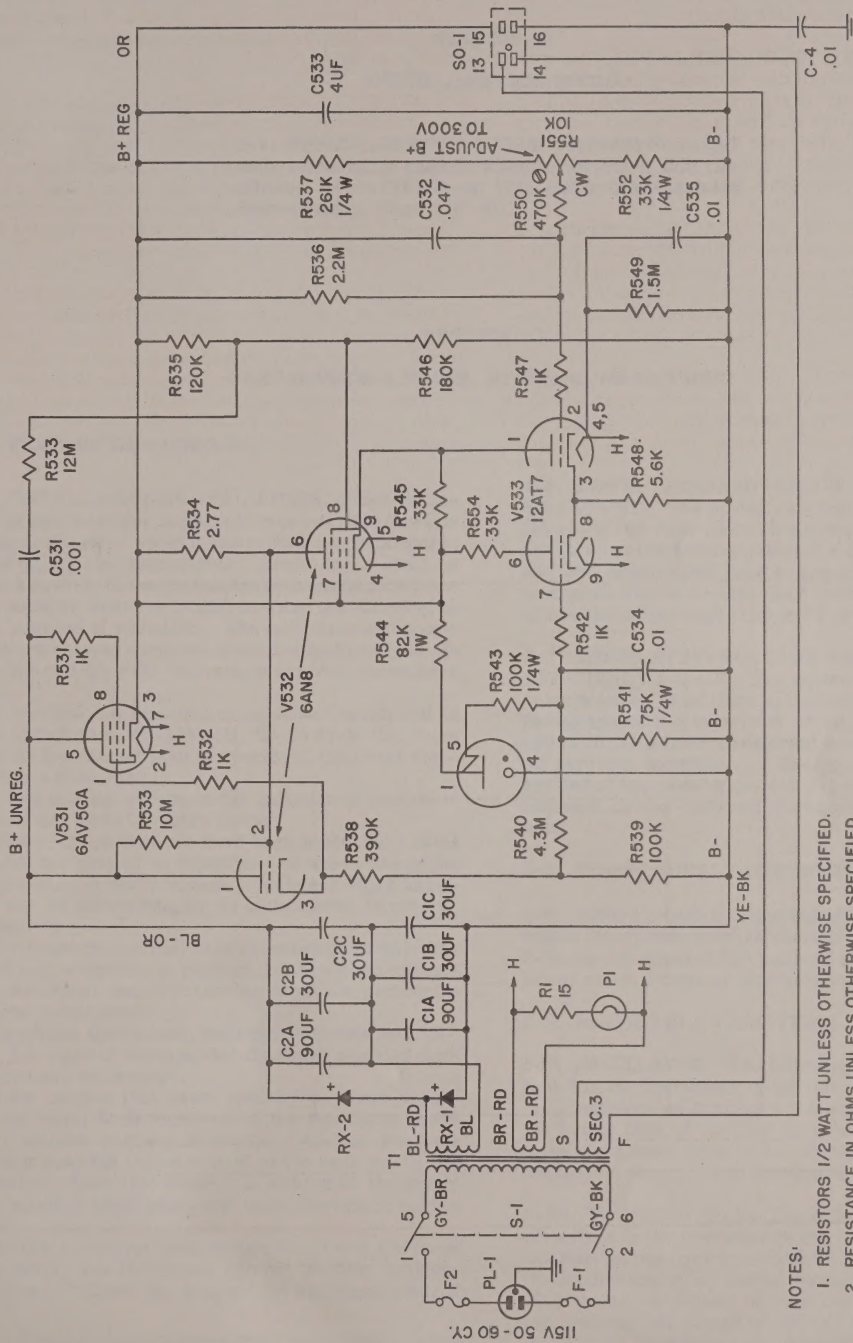


Figure 1-6. Power Supply - Complete Circuit, Schematic Diagram

SECTION II

SPECIAL SERVICE TOOLS

2-1. SPECIAL SERVICE TOOLS. There are no special tools required for the operation or service of Unit Oscillator, Types 1215-B and 1215-BS1 or Unit Regulated Power Supply, Type 1201-B.

SECTION III

PREPARATION FOR USE, STORAGE, OR SHIPMENT

3-1. PREPARATION FOR USE.

3-2. INSTALLATION AND FACILITIES. Since the oscillator and the power supply unit are portable there is no requirement for special instructions or procedures for installing the instruments. Precautions shall be taken, however, to insure that the instruments are properly secured when not in use, and are not placed near other sources of radiation. The oscillator and power supply are shipped complete with tubes installed and are ready for use after the following precautions have been taken:

- a. Insure that the line cord of the power supply unit is close enough to a 105-125 volt, 50-60 cycle line from which the instrument is to be operated. Check the voltage with a voltmeter.
- b. Check that the air where the units are to be used is cool and dry and circulates freely.
- c. Check that provisions have been made for a level surface, not subject to vibration, on which to use the instruments. A study table or work bench with a minimum top 25 inches long by 20 inches wide is recommended.
- d. Exercise the normal care in removal usually afforded test equipment to prevent damage when unpacking instructions and accessories from the protective shipping containers.
- e. Check the instrument, including all tubes and cables, for signs of damage that may have occurred during shipment or storage.
- f. Make certain that panel switch on power supply unit and panel knob and dials of the oscillator move freely without sticking or binding. Loosen wing nut on chuck over the output control at the rear end of the oscillator. Move the control in and out of the shield from which it protrudes, and make certain it moves freely.
- g. Return the power unit switch to off and the panel knob, dials, and the output control to their original positions. Tighten the wing nut on the output control.

3-3. POWER REQUIREMENTS OF OSCILLATOR UNIT.

3-4. POWER REQUIRED FOR R-F RANGE AND POWER OUTPUT. The power requirements of the oscillator are 300 volts dc at 25 ma and 6.3 volts ac or dc at 0.3 amperes for any selected r-f signal between 50 and 250 megacycles with a power output of 100 mw minimum into a 50-ohm load (except above 240 mc where the output may drop to 85 mw).

3-5. MODULATING VOLTAGE NEEDED FOR AUDIO FREQUENCY RANGE. The power required for plate modulation is, in addition to that given in the preceding paragraph for r-f signal and output, a modulating voltage of 40 volts from an external modulating source for 30 per cent modulation. The modulating voltage is applied at the modulation jack J-1 provided and superimposed on the 300-volt dc supply from the power unit.

3-6. POWER SUPPLY UNIT REQUIREMENTS.

3-7. INPUT POWER REQUIREMENTS. The power supply input power requirements are given in paragraph 3-2a for an output of 300 volts dc $\pm 1\%$ at 70 ma (regulated) and 6.3 volts ac at 4 amp (unregulated).

3-8. ALLOWABLE VARIATIONS.

3-9. OSCILLATOR. The following variations are allowed in the operations of the oscillator:

- a. Frequency calibration accuracy: 1% at no load.
- b. Sweep rate of vernier dial, motor driven by external frequency control (for sweeping applications of oscillator described in paragraph 1-11): Up to 5 cps.

3-10. POWER SUPPLY. The following variations are permitted in the operation of the power supply unit:

- a. 300-volt dc output: $\pm 1\%$ at 70 ma.
- b. Regulation of dc output voltage: constant within $\pm 0.25\%$ for all values of load current and line voltage (between the limits of 105 to 125 volts).
- c. Ripple: less than 1 mv (for 120 cps) at full load.
- d. Internal impedance: 0.4 ohms + 10 uh max.

3-11. STORAGE OR SHIPMENT.

3-12. PACKING INSTRUCTIONS: To prepare the oscillator and power supply unit for storage, proceed as follows:

- a. Before starting to pack, wipe all metal parts of each equipment with a dry, lintless cloth.
- b. Wrap each instrument with its accessories (separately) in Kraft paper. Pack in a sturdy cardboard box cushioned with packing material.
- c. Place a fresh dessicant filled container next to each unit.
- d. Seal the cardboard boxes with moisture-proof tape

and immediately mark each container for identification of contents.

NOTE

If storage conditions are apt to be damp, place additional dessicant inside the cardboard boxes.

e. If the instruments are to be shipped, place each packed cardboard box in a wooden shipping box with ample protective barriers of greaseproof cardboard or paper on all four sides, and the top and bottom. Then seal each shipping box and attach shipping labels.

SECTION IV
OPERATING INSTRUCTIONS

4-1. PRELIMINARY.

4-2. OUTPUT CHARACTERISTICS OF OSCILLATOR.

After the power supply has been turned on, the frequency of the oscillator is adjusted by means of the frequency dial and the output adjusted by positioning the adjustable output coupling loop as described in paragraph 3-2. Typical output characteristics are shown in figure 4-1.

4-3. WARM-UP PERIOD. The frequency of the oscillator varies for some time after the power has been applied, until the temperature has stabilized. The warm-up drift is usually well under -0.25% depending upon frequency and varies considerably from one oscillator to the other. Figure 4-2 shows a representative curve. The power supply unit shall be placed on heat for at least two hours.

4-4. CONNECTORS AND CONTROLS. Figure 4-3 lists the connectors and operating controls of the oscillator and power supply unit. Connection between equipment and equipment being tested, or between oscillator and test instrument it supplies with an r-f signal, together with the purpose and use of each control, are given with figure and index number references.

4-5. PRELIMINARY GENERAL CHECKS. Check that the required precautions necessary for the preparation and use of the instruments have been taken as prescribed in paragraph 3-2.

NOTE

Refer to the power requirement data and allowable variations which are given in paragraphs 3-6 through 3-10 in making the following pre-operation power checks.

4-6. PRE-OPERATION CHECKS. Using the pertinent measuring instrument and/or indicator, such as ammeter, voltmeter, ac and dc electron voltmeter, wattmeter and frequency meter, and as required, check the power input and output of the power supply unit and the output frequency and power output of the oscillator, as prescribed in the following order:

- Power supply unit input voltage at input connector (2, figure 4-6).
- Power supply unit output voltages, ac and dc at output connector (7).
- Oscillator output frequency range at output connector (9, figure 4-4) for three random settings of frequency dial (6). Repeat latter check at external connector or adapter at test equipment end of output cable (12). The external fitting is not shown in the illustration since it is not supplied with the oscillator.
- Oscillator power output at output connector.

WARNING

Do not touch the terminals of phone plug in making check e which follows. The life you save may be your own.

e. Oscillator plate current at MODULATION jack J-1 (9, figure 4-5). Insulate the terminals of the phone plug (10) and insert plug into jack. The plug terminals are now "hot". Head warning. The plate current shall decrease to zero. Remove plug. The plate current shall return to the original reading.

4-7. PRE-OPERATION CONNECTIONS. Make the connections necessary for the operation of the units. Refer to paragraphs 3-3 and 3-6 for procedures and power requirements and to figure 4-3 for connector locations. Proceed in the following order:

- Connect line cord of power supply unit to external power input source.
- Plug oscillator into power supply unit by means of oscillator line cord.
- Connect output cable to output connector of oscillator.
- Connect other end of output coaxial cable to the coaxial elements of test equipment, as required by application, by means of a coaxial connector or adapter and cable supplied by test equipment under test or test equipment the oscillator is intended to drive.
- For modulation of the oscillator, connect external modulating input voltage cable of external control or modulating voltage source at MODULATION jack J-1 by means of connector or adapter externally provided.

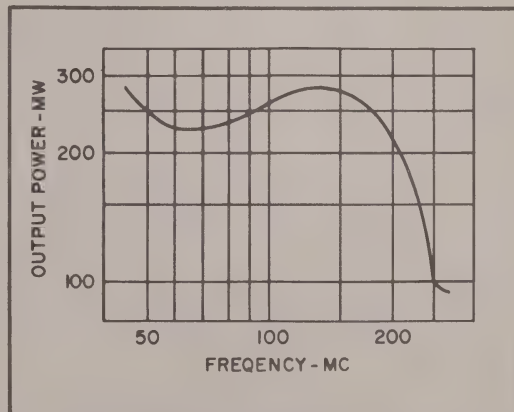


Figure 4-1. Unit Oscillator, Typical Output Characteristics

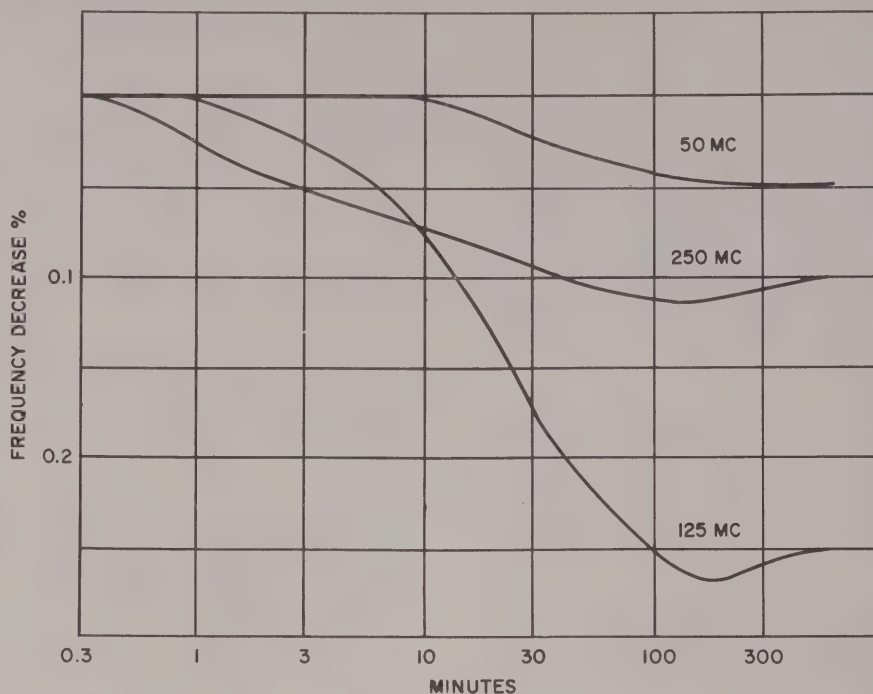


Figure 4-2. Unit Oscillator, Typical Warm-Up Drift

f. The unit is now ready for manual operation.

g. If automatic operation is desired, proceed as follows.

h. Connect either one of the oscillator panel dials to an external frequency control, such as a sweep or dial drive, for the sweep applications of the oscillator described in paragraph 1-11. To connect the external control to the smaller 3-1/4 inch vernier dial (4, figure 4-4), proceed as follows: Remove the dial indicator pointer attached by two screws to the dial cover (5) above the dial. Disengage the frequency control knob (3) from the pinion on which it is mounted, by loosening two set screws. Remove the knob and attached dial. Remove three screws from rear of dial attaching it to knob, and remount dial to pinion. Couple external drive to dial by means of hardware supplied with drive. To connect the 6-inch frequency dial (6) to an external frequency control, remove smaller dial as indicated. Then remove dial cover and frequency dial indicator pointer on panel above frequency dial and couple external control to the frequency dial.

i. All test connections for calibrating the oscillator and power supply unit are prescribed or referenced in Section VII.

j. When the power supply unit is used as a source of power for instruments other than the oscillator, connect the power supply to the external instrument at the output connector by means of a mating plug supplied

with the power unit for external connections. Terminal numbers are marked on the plug. Connect to terminals No. 13 and 14 for 6.3 volts ac and to terminals No. 15 and 16 for 300 volts dc. See the following note for a change in line voltage for the power unit when applicable in this connection.

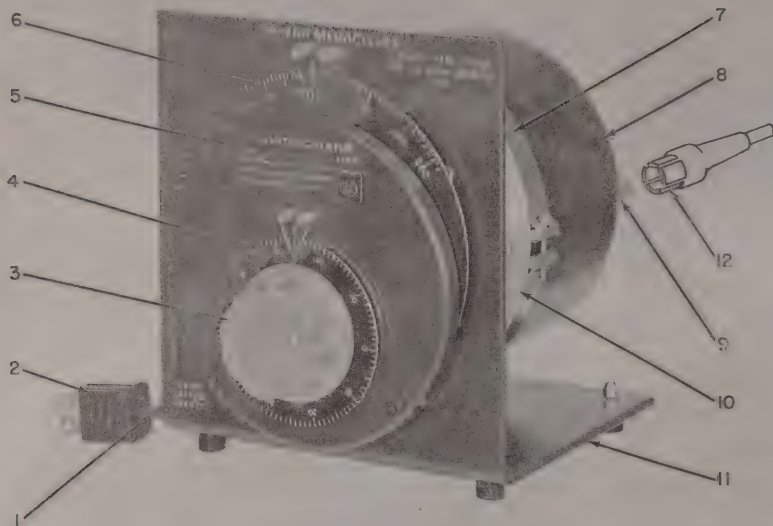
NOTE

The power supply unit will operate satisfactorily from a 400-cycle line. For load currents exceeding 50 ma, the minimum line voltage shall be 107 volts.

k. For connection given in step h, when the unit is run on a 125-volt line, and when full output of the power supply is required for operating the external instrument, replace the fuses F-1 and F-2 (10 and 11, figure 4-7) in the power unit by removing the dust cover (3, figure 4-6) from the power supply unit. To remove the cover, loosen the black thumb screw (6, figure 4-7) on the left hand side of the cabinet, and slide the cover off, away from the front panel. Remove F-1 and F-2 from the fuse holders (8, figure 4-6), and replace with 1 amp fuses. Input current is below 0.8 amp when the power supply is used with the oscillator. It is just above 0.8 amp when run on a 125-volt line with both output voltages fully loaded.

CONNECTORS	PURPOSE AND USE	FIGURE NO.	INDEX NO.
Power Supply Power Cord Connector (CAP-19)	Connects Unit Regulated Power Supply, Type 1201-B to external power source.	4-6	1 and 2
Power Supply Output Connector P/N P-2404 CCT mfd by 71785 (CDMP-12-4)	Connects power supply to oscillator or external instrument for ac and dc output voltages.	4-6 4-7	7 14
Power Supply Output Plug	Mates with power supply output connector for external connection as described above.	4-6	10
Oscillator Power Cord Connector (1215-33)	Connects oscillator power cord to power supply output connector.	4-4	1 and 2
Oscillator Output BNC connector or TYPE 874 (Built into rear end of adjustable output coupling loop assembly L-2)	Connects oscillator to cable or test instrument coaxial element connector for frequency and power outputs.	4-4 4-5	9 14
Oscillator Output Cable (TYPE 874-C58)	Cable connects oscillator to test instrument coaxial connector or adapter as described above.	4-4	12
Oscillator Modulating Jack J-1, P/N 2J-1439, mfd by 82389 (CDSJ-10)	Connects oscillator to external modulating voltage control or source.	4-5	9
Oscillator Phone Plug P/N 440, mfd by 82389 (CDMA)	Plugs into Jack J-1 to furnish modulating voltage.	4-5	10
Oscillator Panel Dials	Main dial (6) connects to oscillator and reads frequency. Vernier dial (4) is geared to main dial and is used as a reference vernier.	4-4	4 and 6
UNIT REGULATED POWER SUPPLY, TYPE 1201-B			
"POWER" ON, OFF	ON position of power switch supplies power to operate oscillator.	4-6	2
Frequency Dial	UNIT OSCILLATOR, TYPE 1215-B In conjunction with vernier dial (for fine tuning), controls output frequency in tuning circuit LC-1 (para 1-27).	4-4	6
Adjustable Output Coupling Loop L-2	Controls power output in output circuit by means of manual manipulation of output connector (see 9, figure 4-4).	4-5	14
Codes:	Manufacturer		
71785	Cinch Mfg. Co., Division of United Carr Fastener Corp. Chicago, Ill.		
82389	Switchcraft, Inc. Chicago, Ill.		

Figure 4-3. Connectors and Controls



- | | |
|------------------------|----------------------------------|
| 1. Power Cord | 7. Shield Clamp Assy |
| 2. Connector | 8. Shield |
| 3. Control Knob | 9. Adjustable Coupling Loop Assy |
| 4. Vernier Dial | 10. Oscillator Base Assy |
| 5. Dial Cover | 11. Panel and Base |
| 6. Main Frequency Dial | 12. Cable Connector |

Figure 4-4. Unit Oscillator - Panel, Base Assembly and Shield

4-8. PRELIMINARY ADJUSTMENTS AND INITIAL SETTINGS. Make the preliminary adjustments and initial settings required for output of power supply (see paragraph 3-6) and for the frequency and power output of the oscillator (see paragraph 3-3) as prescribed, in the following order:

a. Screwdriver adjustment of power supply unit potentiometer R-551 (1, figure 4-8) for output voltage: to 300 volts $\pm$ for an indication of 300 volts at the output terminals by a reliable voltmeter.

b. Adjustment of oscillator frequency dial (6, figure 4-4) for frequency signal: to frequency setting desired within range of 50-250 megacycles as indicated on dial or for an indication of selected frequency on an accurate frequency meter.

c. Adjustment of power output of oscillator: to designed output of at least 100 milliwatts except above 240 MC (see para 3-4) by means of the output control (9, figure 4-4) for an indication of 100 milliwatts on a reliable rf wattmeter. Move output control as prescribed in paragraph 3-2. Withdraw control slightly for less power, and for more power move it in a little through the shield (8, figure 4-4 and 12, figure 4-5) from which it protrudes.

4-9. STARTING PROCEDURE.

4-10. POWER SUPPLY UNIT. With the front panel switch S-1 (4, figure 4-6) in the OFF position, plug the male end (2) of the power cord cable attached to the power supply unit, into a 105-125 volt ac (50 cps to 60 cps) source. Switch the power to ON position and check to see that the pilot lamp (6, figure 4-6) directly to the right of the switch, lights. Allow the instrument to warm up for 2 hours. Then check the line voltage and the two output voltages as directed in steps a and b of paragraph 4-6. Turn off the power.

4-11. OSCILLATOR. With the power supply switch in the OFF position, plug the male end (2, figure 4-4) of the oscillator line cord (1) into the power socket SO-1 (7, figure 4-6) on the upper right hand side of the power supply cabinet. Switch the power in the power supply unit to ON and check the frequency and power outputs of the oscillator, as directed in steps c and d of paragraph 4-6, and check the oscillator plate current at the MODULATION jack J-1 as prescribed in step e.

4-12. NORMAL OPERATION.

4-13. OSCILLATOR. Select the frequency and power outputs as follows:

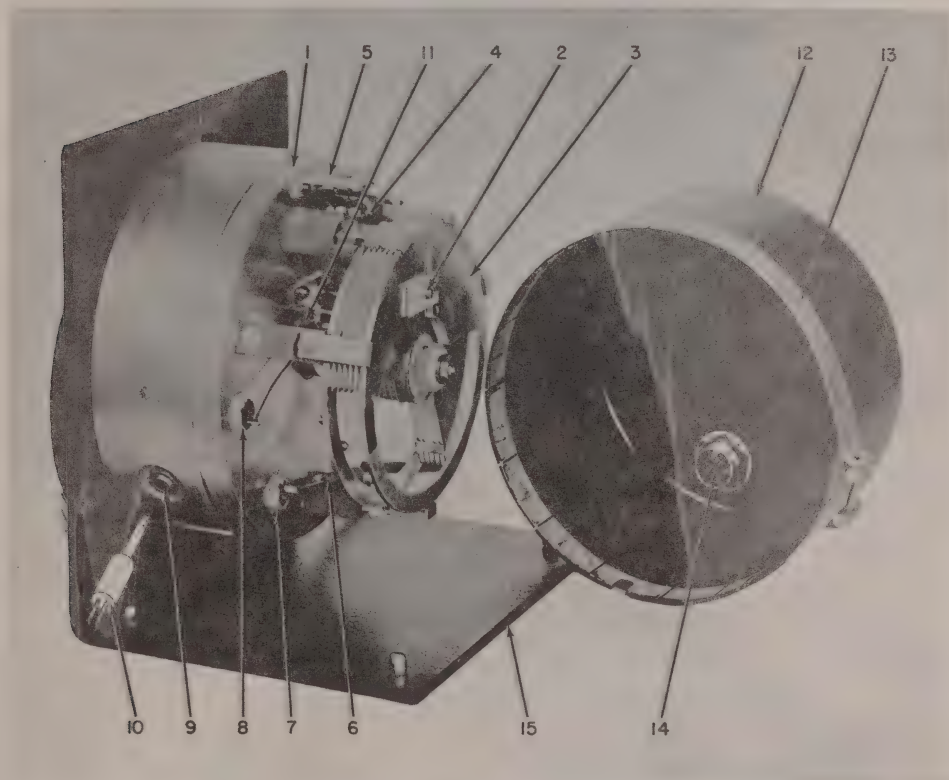
a. Select any frequency from 50 to 250 mc by setting the frequency dial (6, figure 4-4) in conjunction with the fine tuning vernier dial (4) to the desired frequency. For example, to select an output frequency of 250 mc, rotate the frequency dial by means of the control knob (3) to exactly 250 mc on the calibrated frequency dial. The vernier dial is for reference only and is useful when resetting to a previous frequency. When a frequency setting has been made with the main dial record the reading of the main dial and the reading of the vernier dial. Using the vernier dial in this way permits accurate resetting when returning to this frequency during a measurement. Indications of what is to be expected are shown in the curve of a typical warm-up drift in figure 4-2.

CAUTION

Forcing the frequency dial beyond its normal travel may destroy the calibration of the instrument.

b. Select the output wattage by adjusting the output control as prescribed in step c of paragraph 4-7. Typical output characteristics are shown in figure 4-1.

4-14. POWER SUPPLY UNIT. Adjust the potentiometer R-551 for power output as directed in paragraphs 1-30 and 3-10.



- | | |
|--------------------|-----------------------|
| 1. Base Assy | 8. C-7 |
| 2. C-1 | 9. J-1 |
| 3. LC-1 | 10. Phone Plug |
| 4. V-1 | 11. C-4 |
| 5. Tube Clamp | 12. Shield |
| 6. R-8 | 13. Shield Clamp Assy |
| 7. C-5 | 14. L-2 |
| 15. Panel and Base | |

Figure 4-5. Unit Oscillator, Interior View Showing Component Locations

4-15. STOPPING PROCEDURE.

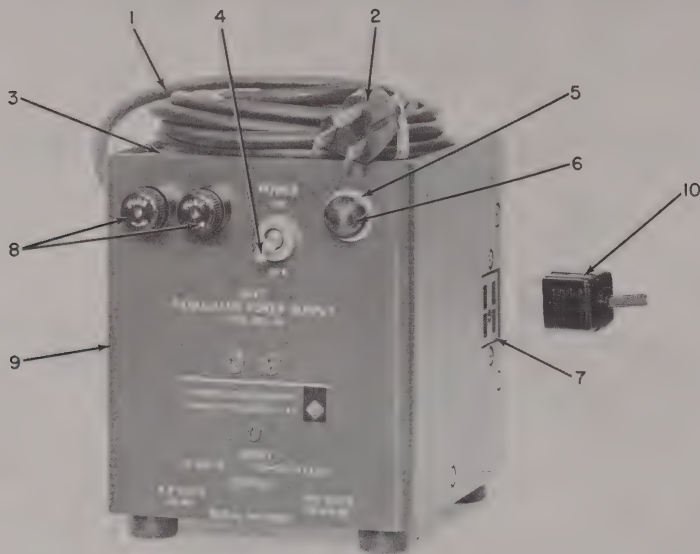
4-16. OSCILLATOR. Turn off the oscillator by throwing the power unit front panel switch to OFF position. Remove the power plug first from the power supply socket SO-1 in the power unit, and then, from the put-put control (9, figure 4-4), remove the output cable (12), and properly secure the oscillator.

4-17. POWER SUPPLY UNIT. When the power supply unit is used with external instruments, first re-

move the line cord from the power input source and then remove the mating plug (10), figure 4-6) from the output socket SO-1 supplied for the external connections.

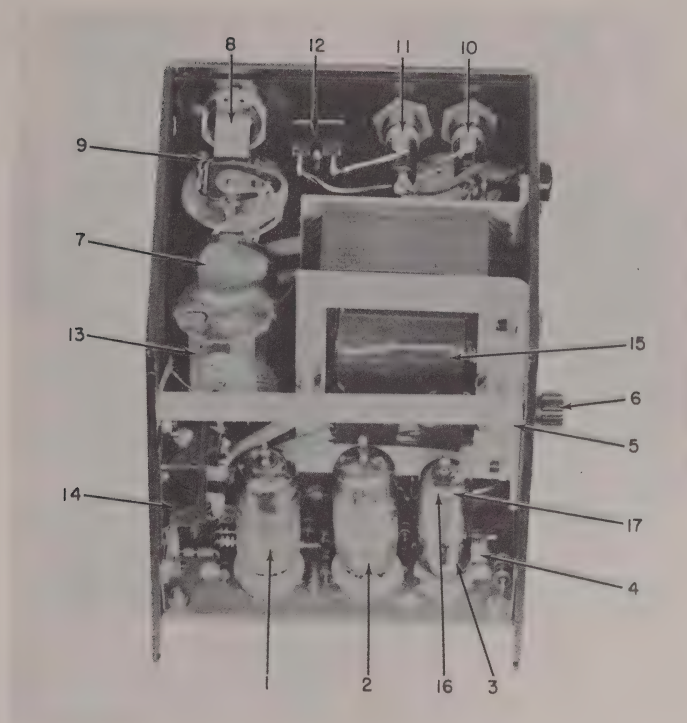
NOTE

Readjustment of the potentiometer for the output voltage of the power supply unit usually is unnecessary, excepting after replacement of Tube TYPE 5651 (V-534) (1, figure 4-7).



- | | |
|-------------------|---------------------|
| 1. Line Cord | 6. Pilot Lamp |
| 2. Connector | 7. Output Connector |
| 3. Dust Cover | 8. Fuseholders |
| 4. Switch | 9. Front Panel |
| 5. Pilot Lamp Cap | 10. Plug |

Figure 4-6. Power Supply - Front Panel and Output Connector



- | | |
|----------------|-----------|
| 1. V-534 | 9. R-1 |
| 2. V-533 | 10. F-1 |
| 3. V-532 | 11. F-2 |
| 4. C-532 | 12. S-1 |
| 5. Tie Bar | 13. C-4 |
| 6. Thumb Screw | 14. SO-1 |
| 7. V-531 | 15. T-1 |
| 8. Pilot Lamp | 16. R-549 |
| | 17. R-536 |

Figure 4-7. Power Supply, Interior View Showing Component Locations



- | | |
|----------|-----------------|
| 1. R-551 | 4. Etched Board |
| 2. C-1 | 5. Screw |
| 3. C-2 | 6. RX-2 |
| 7. RX-1 | |

Figure 4-8. Power Supply, Bottom View Showing Component Locations

SECTION V

PERIODIC INSPECTION, MAINTENANCE, AND
LUBRICATION.

5-1. PREVENTIVE MAINTENANCE.

5-2. PERIODIC INSPECTION. For preventive maintenance to be effective, the work performed shall be done at regularly scheduled intervals. Figure 5-1 lists, according to calendar or operating time periods, all regularly required inspections of the oscillator or power supply unit, together with any regularly required preventive maintenance such as lubrication, tightening, etc.

NOTE

Operating personnel shall not perform any repair or replacement procedures beyond the preventive maintenance instructions prescribed in figure 5-1 and paragraph 5-3 and shall not trouble shoot the oscillator or power supply unit except as prescribed in the trouble shooting chart in figure 6-1. If either instrument together with the coaxial cables and connectors needs repairs, they shall be returned to the depot for maintenance work.

5-3. REPLACEMENTS. The fuses, the pilot lamp, and the electron tubes may be replaced by operating personnel if necessary. Trained test personnel shall be informed of these replacements as required, for determination of the cause of failure. Perform the following replacement and removal procedures as required:

WARNING

Be sure the power line cord of the power supply unit is disconnected from the ac power source before replacing or doing any work inside of either equipment.

a. Fuse Replacements. The fuses F-1 and F-2 (10 and 11, figure 4-7) are located in the fuseholders (8, figure 4-6) on the upper right hand side of the power supply unit behind the front panel. Loosen the black thumbscrew (6, figure 4-7) on the left hand side of the cabinet and slide the dust cover (3, figure 4-6) off the unit, away from the front panel. Remove the fuses from the fuseholders and replace with new fuses of identical rating.

CAUTION

When replacing fuses F-1 or F-2, do not insert any new fuses with a greater ampere rating than the original fuses (0.8 ampere), except when the power supply unit is operated on a 125 volt ac line and used with an external instrument requiring both output voltages fully loaded. In this case, the original fuses shall be replaced with 1 ampere fuses in the fuseholders.

b. Pilot Lamp Replacement. The pilot lamp P-1 (6, figure 4-6) is located on the upper right hand side of the front panel to the right of the fuses. Unscrew the pilot lamp cap (5), remove the lamp from its holder, R-1 (9) and replace with another lamp of identical rating (P/N 44).

c. Electron Tube Replacements. The location of each tube is shown as follows:

(1) Oscillator tube TYPE 12AT7 (V-1): (4, figure 4-4).

(2) Power supply tube TYPE 6AV5-GA (V-531): (7, figure 4-7).

(3) Power supply tube TYPE 6AN8 (V-532): (3, figure 4-7).

(4) Power supply tube TYPE 12AT7 (V-533): (2, figure 4-7).

(5) Power supply tube TYPE 5651 (V-534): (1, figure 4-7).

d. Removal of Oscillator Tube. Remove tube clamp (5, figure 4-5) attached to base assembly (1) with two screws, and unscrew tube from socket. Replace with new tube of identical rating (TYPE 12AT7).

e. Removal of Power Supply Tubes. Remove dust cover as in procedure a. Remove tube V-531 and 2 screws (5, figure 4-8) at the rear of the etched board (4) and swing board out of the instrument on the hinges provided. Remove other 3 tubes from sockets. Replace all tubes of identical ratings (see procedure c.). For access to rectifiers RX-1 and RX-2 (see procedure f.) and capacitors C-1 and C-2 (see procedure g.), remove screws from hinges of etches board (4) and remove board from instrument.

NOTE

Replacements of components in following procedures f. and g. shall not be made by operating personnel (see note preceding paragraph 5-3), without authorization.

f. Power Supply Rectifier Replacements. See 7 and 6, figure 4-8 for locations of rectifiers RX-1 and RX-2. Remove dust cover and etched board as prescribed in procedures a and e respectively. Remove 1 screw, 3 washers, and 1 nut attaching RX-1 and RX-2 to panel assembly and remove rectifiers. Replace with new rectifiers of identical ratings. (P/N DCX8H1E1R).

g. Power Supply Capacitor Replacements. See 2 and 3, figure 4-8 for locations of capacitors C-1 and C-2. Remove dust cover and etched board as directed in procedures a and e. Remove 2 screws, 2 washers, and 2 nuts attaching capacitors C-1 and C-2 to panel assembly. Remove C-1 and C-2 and replace with new capacitors of identical ratings. (P/N 104111G1S7C1X2).

5-4. CLEANING. When cleaning the instruments, observe the following precautions and general cleaning techniques:

WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
MONTHLY (and before each new application of either unit.)		
1. Operation check of oscillator and power supply unit.	a. Follow operation instructions given in Section IV.	a. If it is found as a result of the operation check, or for any other reason, that either instrument requires overhaul maintenance, return instrument to depot. b. If replacement of fuses, panel lamp or electron tubes is necessary, follow procedure given in paragraph 5-3.
2. All leads connected to etched board (4, figure 4-8) of power supply unit.	a. Check for adequate slack.	a. Loosen tight leads.
3. Power supply tube clearance of leads from transformer T-1 (15, figure 4-7) to socket SO-1 (14) (output power connector).	a. Visually check for tube clearance.	a. If rerouting of leads is required, return instrument to depot for maintenance work.
4. Negative terminal of rectifier RX-1 (7, figure 4-8)	a. Mechanically check that terminal is not touching the front panel.	a. If terminal is making contact with front panel, move it out of the way.
5. All electron tubes and pilot lamp.	a. Visually inspect condition of all tubes for cracked sockets, loose envelopes and for firm seating in sockets. b. Visually inspect condition of pilot lamp.	a. Replace any tube with cracked envelope or otherwise physically damaged as prescribed in paragraph 5-3. Be sure replaced tubes are of right type. (See paragraph 5-3). b. Replace pilot lamp if physically damaged as per paragraph 5-3.
6. All operating controls	a. Check mechanical action of controls for signs of binding, scraping, looseness, and for positive action.	a. If knob is loose, tighten set screws. CAUTION Do not disassemble oscillator panel knob from vernier dial (5, figure 4-4). Removing the 3 screws attaching dial to knob can destroy the frequency calibration of the oscillator.
7. Connectors, Capacitors, Resistors, Switch, Transformer.	a. Inspect all connectors, capacitors, resistors and transformer for looseness or signs of damage. Be certain all screws are tight.	a. Clean, tighten, and repair all connections as needed. NOTE If any defective parts are found among these components, replacement shall be performed by authorized personnel only.

Figure 5-1. Periodic Inspection Chart (Sheet 1 of 2)

WHAT TO CHECK	HOW TO CHECK	PRECAUTIONS
8. Exteriors of both instruments.	a. Visually inspect panel and components for dirt, corrosion, fungus growth, and moisture.	a. Clean as directed in paragraph 5-4. CAUTION Never use steel wool to clean any part of either instrument. Shorting of circuits could be caused.
9. Lubrication checks of oscillator and power supply.	a. Check lubrication of all moving parts of oscillator when unit is used for sweep applications. (Refer to paragraph 5-6.) b. Check lubrication of thumbscrew on tie bar of power supply cabinet as directed in paragraph 5-7.	a. If oscillator requires lubrication or if it has too much, when used for sweep application notify authorized personnel as to condition for correction. CAUTION Operating personnel shall have nothing to do with coupling oscillator to external frequency control for sweeping. application. Only trained technical personnel can remove vernier dial from control knob without upsetting the frequency calibration of the instrument. b. If lubrication of screw threads is required, lubricate very lightly; if there is too much, correct condition.
SEMI-ANNUALLY		
1. Same as MONTHLY check	a. Same as MONTHLY check	a. Same as MONTHLY check
2. Calibration	a. See instructions given in Section VII	a. See instructions given in Section VII

Figure 5-1. Periodic Inspection Chart (Sheet 2 of 2)

WARNING

Perform cleaning operation in a well ventilated room. Use recommended cleaning fluids only.

- a. For general cleaning, use a clean, dry, lint-free cloth or a dry brush.
- b. To remove stubborn dirt, moisten the cloth or brush with cleaning solvent, Federal Specification P-S-661. Wipe clean with a dry cloth.
- c. To clean electrical contacts, use a burnishing tool or a cloth as prescribed in step b.
- d. To remove corrosion, use No. 00 or 000 sandpaper. Apply approved touchup paint where required. Refer to service manuals for type of paint to use.

CAUTION

Never use steel wool for cleaning the instruments. Minute particles may somehow enter and cause damage.

- e. Dust and clean electron tubes carefully. Be sure they are properly replaced.

5-5. LUBRICATION.

5-6. OSCILLATOR. When the oscillator is driven by a sweep or dial drive as described in paragraph 1-11, all moving parts shall be properly lubricated. For lubricant and instructions, refer to applicable -2 Technical Manual for the external frequency control used. No other lubrication for the oscillator is required.

5-7. POWER SUPPLY UNIT. For the power supply unit, the only lubrication required is at assembly for the threads of the thumb screw (6, figure 4-7) attaching the tie bar (5) on the power supply unit. Should it become necessary to remove the tie bar, apply ALCOA thread lubricant to the thumb screw when re-assembling the tie bar.

SECTION VI
TROUBLE SHOOTING

6-1. TROUBLE SHOOTING. If the Unit Oscillators, Type 1215-B and 1215-BS1 and Unit Regulated Power Supply Type 1201-B are suspected of being out of order or have been subjected to rough usage or handling or if damage is suspected, no attempt should be made to do any maintenance or major repair work of any

kind. Accordingly, if the instruments require maintenance or extensive repairs, they shall be returned to the depot where the specialized facilities required for maintenance work, calibration and adjustment are available. (refer to instructions given in paragraph 7-1). See Figure 6-1 for trouble shooting chart.

Trouble	Probable Cause	Remedy
UNIT REGULATED POWER SUPPLY, TYPE 1201-B		
Power switch is ON position but panel lamp does not light.	105-125 volt ac source is not connected to power cord connector.	Connect source to power cord connector.
	Fuse F-1 or F-2 blown.	Replace the faulty fuse with a spare. (Refer to paragraph 5-3a).
		WARNING Before replacing any component or making any minor adjustments or minor repairs, disconnect power supply unit and discharge all high voltage capacitors. Extreme caution should be exercised when working with equipment. If a new fuse burns out immediately after replacement, do not install until cause has been corrected.
	Panel lamp faulty.	Replace panel lamp. (Refer to paragraph 5-3b).
	Defective power cable	Replace power cable.
	Failure of ac power line: Internal wiring broken because of vibration.	Call to attention of authorized personnel.
Excessive 120-cps ripple	Tube V-531 defective if ripple is excessive only at low-line voltages.	Replace V-531 (6AV5GA). Refer to paragraph 5-3 for replacing all tubes.
	Rectifiers RX-1 and RX-2 defective if voltage across C-1 and C-2 is less than 400 volts at full load and 115-volt line.	Operating personnel shall not replace rectifiers, resistors, capacitors, transformer, switch, etc. Refer to paragraph 5-3 f and note preceding it.
	C-1 and C-2 defective if ripple across C-1 and C-2 is greater than 6 volts to peak (2 volts rms).	Refer to paragraph 5-3 g and note preceding procedure f.

Figure 6-1. Trouble Shooting Chart (Sheet 1 of 2)

Trouble	Probable Cause	Remedy
Excessive 60 cps Ripple	RX-1 and RX-2 or C-1 or C-2 faulty if ripple occurs at full load. Heater-Cathode leakage in Tube V-532 or Tube V-533.	Refer to paragraph 5-3. Measure dc voltage from pin 4 or 5 of V-533 with VTVM. If this voltage exceeds 130 volts when output voltage is 300 volts, replace V-532 (6AN8). If voltage is less than 110 volts, replace V-533 (12AT7).
Incorrect Output Voltage	Potentiometer R-551 out of adjustment or V-534 defective. V-531 defective if output voltage drops only at low line and full load. V-533 and V-532 possibly defective if output voltage is completely unregulated.	Reset R-551 if output voltage is regulated and within a few volts of 300. If this adjustment drifts replace V-534. Replace V-531 and check voltage across C-1 and C-2. Voltage from positive terminal of C-2 to negative terminal of C-1 should be 405 volts with full load and 115-volt line. If this voltage is less than 400 volts, check RX-1, RX-2, C-1 and C-2. Replace V-533 and V-532. If output voltage is still completely unregulated, measure voltages at key points with a VTVM comparing them with those given in figure 1-6.

Figure 6-1. Trouble Shooting Chart (Sheet 2 of 2)

SECTION VII

CALIBRATION

7-1. CALIBRATION.

7-2. CALIBRATION INSTRUCTIONS. The Power Supply and Unit Oscillator shall be calibrated once every six months. If the instruments are in continuous operation for extended periods of time, their calibration should be re-checked occasionally. These are precision instruments and have been laboratory calibrated. Therefore, whenever calibration and major or extensive adjustments are necessary, they shall be returned to the depot designated by the service involved (the Air Force Installation at Dayton, Ohio), where the specialized facilities and equipment suitable for making the required measurements necessary for calibration and adjustment will be available.

CAUTION

Under no circumstances, attempt to adjust either the Unit Oscillator or the Power Supply in the field. Any tampering with the instruments will disturb the calibration and render the instruments useless.

7-3. TEST EQUIPMENT REQUIRED FOR CALIBRATION. Figure 7-1 lists the test equipment required and gives its nomenclature, part number or model, application, range, and accuracy. Figure 7-2 shows the test equipment connections required for the Unit Oscillator output checks.

7-4. POWER SUPPLY CALIBRATION PROCEDURES.

a. Mechanical Inspection.

(1) Check that the negative terminal of rectifier RX-1 is not making contact with the front panel.

(2) Check for adequate slack in all the leads connected to the etched board.

b. Preliminary Checks and Adjustments.

(1) Support the etched board and insert all the tubes. Set potentiometer R551 to the center of its range.

(2) To check for transformer breakdown, use a high voltage test set at 300 v dc and measure the leakage from one side of input (115 v 50-60 c) to ground.

(3) Connect the Type 1201-B to the Metered Variac Unit, set for zero line voltage. Turn on the Power Supply and by adjusting the Variac Unit increase the line voltage gradually to 115 v. The input power must be 20 watts.

(4) Place the Type 1201-B on heat for at least 2 hours.

c. Operational Checks.

(1) Connect the Metered Variac Unit to the Type 1570-A Automatic Voltage Regulator.

(2) Set the Metered Variac Unit for 116 volts, as measured on a precision voltmeter.

(3) Adjust potentiometer R551 on the test Type 1201-B for a dc output voltage reading of 300 volts.

(4) Using the DC Voltmeter, check the output of the Power Supply to be regulated within 0.25% (refer to

figure 7-3). This is accomplished by noting the different output voltages as the Power Supply is switched between LL NL, HL NL, LL FL, and HL FL. Specifically set up the conditions in figure 7-3 and note that the regulation is truly -0.25% as the conditions on the Power Supply are changed.

(5) With the Power Supply in LOW LINE FULL LOAD conditions, the ME 153/U Distortion and Noise Meter shall read less than 1 millivolt of ripple when connected across the AC output. The Test Unit AC Voltmeter shall read a minimum of 5.6 ± 0.1 volts.

7-5. UNIT OSCILLATOR CALIBRATION PROCEDURES.

a. Preliminary Checks.

(1) The shield-cover has been matched to the Unit Oscillator and output loop. Do not interchange shield-covers as loop coupling is critical.

(2) Set the trimmer capacitor C1 to the mid-capacitance position. Check that the rotor of the semi-butterfly capacitor LC1 does not short to the stator at either end of the dial span. Clean the semi-butterfly capacitor LC1 with compressed air. Apply 1000 volts dc between the rotor and the stator. Turn the rotor through its entire range and check for any sustained breakdowns.

NOTE

Do not change tube V1 (12AT7) unless absolutely essential. Changing tube V1 will make it necessary to recalibrate the frequency dial.

(3) Before replacing tube V1, check its performance with a tube tester (emission, internal shorts, and open filament), and check its output under load at several frequencies (see figure 7-4).

(4) Check that the output cylinder is mounted securely to the shield cover. Withdraw and insert the output coupling assembly and check that the loop assembly moves smoothly without touching the cylinder wall.

(5) Check the clamping action of the output wing nut. Install the metallic band on the shield-cover; mount the shield-cover on the Unit Oscillator and tighten the band-screws.

(6) Check that the loop does not touch the butterfly assembly. This is evidenced by a complete loss of output.

b. Operational Checks.

(1) Connect a 50 ma dc milliammeter between the +B plate supply of the Power Supply and the plate of the Unit Oscillator. Apply 115 v, 60 c-power through the Metered Variac to the Power Supply. Turn on the Power Supply. Rotate the frequency dial of the Unit Oscillator over its entire range and check that the plate current does not exceed 25 ma at any frequency.

NOMENCLATURE	PART NO. OR MODEL	APPLICATION	RANGE	ACCURACY
UNIT REGULATED POWER SUPPLY, TYPE 1201-B				
1. Distortion and Noise Meter	ME 153/U (GR PART NO. 1932-A)	Across ac output with Power Supply in LOW LINE FULL LOAD conditions	5.6±0.1 v min	Under 1 mv of ripple
2. Metered Variac Unit	W5MT3W	Zero line voltage setting, then gradually to 115 v for input power check Regulated power supply dc voltage output checks with R551 setting adjusted for 300 v output Also applied as input power source for Power Supply unit in calibration procedures of Unit Oscillator	0-115v See figure 7-3	20 w ±0.25%
3. Automatic Voltage Regulator	1570-A	Connected to Variac unit for application described above for Power Supply output checks		
4. AC Voltmeter 0-150 v ±0.25%		Used for readings as required and indicated in calibration procedures	0-150 v	±0.25%
5. DC Voltmeter 0-500 v ±.25% or John Fluke Differential Voltmeter	803	Used for readings as required and indicated in calibration procedures for both Power Supply and Unit Oscillator	0-500 v	±0.25%
6. High Voltage Leakage Test Set, 300 v dc		Applied from one end to input to ground in transformer breakdown leakage test	300 v dc	115 v, 50-60 c
UNIT OSCILLATOR, TYPE 1215-B & 1215-BS1				
7. Power Supply	1203-B or 1201-B	Applied as power source for Unit Oscillator		
8. DC Milli-ammeter		Applied between B plate supply of Power Supply and plate of Unit Oscillator in plate current check	0 through 250 mc of freq dial	25 ma max

Figure 7-1. Calibration Test Equipment Recommended (Sheet 1 of 2)

NOMENCLATURE	PART NO. OR MODEL	APPLICATION	RANGE	ACCURACY
9. Power Supply, 1000 v dc		Applied between rotor and stator of LC1 with C1 in mid C position and with rotor turned through entire range for rotor breakdown check	1000 v dc	
10. Electronic Counter	FR 38/U (HP PART NO. HP 524-B)	Items 10 through 13 applied for readings as required and indicated in calibration procedures and figure 7-4	See figure 7-4	
11. Frequency Converter	HP 525-A			
12. Frequency Converter	HP 525-B			
13. Transfer Oscillator	HP 540-B			
14. Coaxial Attenuator VSWr less than 1.1 in freq range 40- 260 mc, res. 50 ohm	10db	Items 14, 15, & 16 applied in output checks as indicated in calibration procedures. (Connections are shown in figure 7-4)	50-250 mc * 50-240 mc **	90 mw * 100 mv **
15. Thermistor Mount	MX-2144/U (HP PART NO. HP 477-B)			
16. Power Bridge	PRD 650-B or equal			
* For 1215-B Unit Oscillator ** For 1215-BS1 Unit Oscillator				

Figure 7-1. Calibration Test Equipment Recommended (Sheet 2 of 2)

(2) Insulate the terminals of a phone plug. Insert the plug into the MOD jack (CAUTION: plug terminals are "Hot."): the plate current must decrease to zero. Remove the insulated phone plug; the plate current must increase to the original reading.

(3) Using an HP524-B, an HP525-A, an HP525-B, and an HP540-B (either power supply may be used subject to paragraph 3-4 limitations) or equivalent frequency measuring equipment; check the frequency at the low end of the dial to be 48 mc or less. Check the frequency at the high end of the dial to be 260 mc or greater.

(4) Check the backlash at three points over the frequency range to be less than the thickness of the indicator line.

c. Output Checks.

(1) Interconnect the necessary test equipment as indicated in figure 7-2.

(2) Adjust the output coupling assembly until the Type 1215-B will deliver 90 milliwatts (2.12 volts) into a 50 ohm load over the frequency range of 50 to 250 mc.

The Type 1215-BS1 will deliver 100 milliwatts into a 50 ohm load (except above 240 mc where the output may drop to 85 milliwatts).

NOTE

Note that because a 10 db pad is used ahead of the PRD 650-B Power Bridge it is only required that the bridge measure 9 (or 10) milliwatts as the 1215-B (or 1215-BS1) frequency dial is rotated through most of its range. The 10 db pad also allows the Unit Oscillator to see an effective output load of about 50 ohms.

d. Frequency Dial Calibration Check. Loosely couple the Unit Oscillator to the appropriate frequency measuring system (refer to sub-paragraph b(3)) and check the frequency dial calibration to be within 0.75% at the calibration frequencies given in figure 7-4.

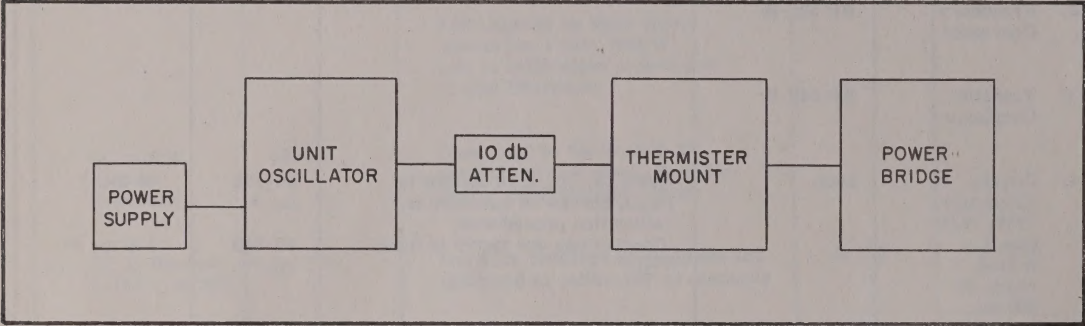


Figure 7-2. Calibration Test Equipment Connections Required for Oscillator Output Checks

Condition	Abbreviation	Input (V AC)	Output +B Load (Ohms)	+B Load Rating (Watts)	Output AC Load (Ohms)	AC Load Rating (Watts)
L Line No Load	LL NL	105	infinity	-----	infinity	-----
H Line No Load	HL NL	1125	infinity	-----	infinity	-----
H Line Full Load	LL FL	105	4400	30	1.5	30
H Line Full Load	LL FL	125	4400	30	1.5	30

Figure 7-3. Load Conditions Used in Power Supply Calibration

Megacycles		
48	90	230
50	100	240
55	120	250
70	150	260
80	200	

Figure 7-4. Frequency Dial Calibration Chart